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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/676,092	10/02/2000	MASAHIKO KUBOTA	35.G2655	4872

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EXAMINER
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FEGGINS, KRISTAL J

ART UNIT	PAPER NUMBER
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2861

DATE MAILED: 03/28/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/676,092

Applicant(s)

KUBOTA ET AL.

Examiner

K. Feggins

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☐ Claim(s) \_\_\_\_ is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☒ All b) ☐ Some \* c) ☐ None of:  
1. ☒ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).  
\* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_ 6) ☐ Other: \_\_\_\_

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-2, 5, 8 & 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshimura (US 5,905,515) in view of Usui et al. (US 6,074,040)

#### **Yoshimura disclose the following claimed limitations:**

- \* a liquid discharging head/an ink ejecting device/ (col 2, lines 28-30, fig 1)
- \* a plurality of liquid channels formed on a connected surface of one of said pair of substrates (col 2, lines 28-42, fig 1)
- \* a plurality of driving elements/actuator/, each formed at a predetermined position above a corresponding one of said plurality of liquid channels (col 2, lines 28-42, fig 1)
- \* orifices, each communicating with a distal end of a corresponding one of said plurality of liquid channels (col 2, lines 28-42)
- \* wherein a liquid is discharged from each of said orifices by an operation of corresponding one of said plurality of driving elements (col 2, lines 28-42)
- \* wherein a face surface, serving as an outer surface of a member including said orifices is coated with a material having an ultrahigh water-repellent property (col 2, lines 28-42, fig 1)

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\* a number of actuators that are used as driving elements to discharge ink(col 2, lines 28-42, fig 1)

**Yoshimura disclose all of the claimed limitations except for the following:**

- \* a pair of substrates connected in a laminated state
- \* wherein each of said plurality of driving elements is heating element for generating thermal energy
- \* wherein the liquid with in each of said plurality of liquid channels is boiled by a corresponding one of said heating elements to generate a bubble in the liquid, and the liquid is discharged from a corresponding one of said orifices due to a pressure generated during the generation of the bubble

**Usui et al. disclose the following claimed limitations:**

- \* a pair of substrates connected in a laminated state (col 12, lines 65-67) for the purpose achieving no abnormalities of ink drops during the ejection.
- \* wherein each of said plurality of driving elements is heating element for generating thermal energy (col 2, lines 33-37, col 22, lines 1-31, fig 14) for the purpose of creating a pressure to eject ink.
- \* wherein the liquid with in each of said plurality of liquid channels is boiled by a corresponding one of said heating elements to generate a bubble in the liquid, and the liquid is discharged from a corresponding one of said orifices due to a pressure generated during the generation of the bubble (col 2, lines 33-37, col 22, lines 1-31, fig

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14) for the purpose of providing an ink jet print head capable generating bubbles for ink drop ejection.

**Nevertheless**, Yoshimura discloses the claimed invention except that a plurality of driving elements are heating element for generating thermal energy instead of an actuator device for discharging the ink. Usui et al. shows that an actuator for discharging ink is an equivalent structure know in the art (col 2, lines 29-37, col 5, lines 23-52, col 6, lines 10-27, col 22, lines 1-37, figs 1-4 & 14). Therefore, because these two devices were art recognized equivalents at the time the invention was made, one of ordinary skill in the art would have found it obvious to substitute an actuator device for heating elements for generating thermal energy to eject ink from a printhead.

**Furthermore**, it would have been would have been obvious at the time of the invention was made to a person having ordinary skill in the art to utilize a pair of substrates connected in a laminated state, a plurality of driving heating elements for generating thermal energy; and where the liquid with in each of said plurality of liquid channels is boiled by a corresponding one of said heating elements to generate a bubble in the liquid, and the liquid is discharged from a corresponding one of said orifices due to a pressure generated during the generation of the bubble, taught by Usui et al. into Yoshimura for the purposes of utilizing a pressure apparatus made with heat generating elements for ejecting ink, creating a pressure to eject ink and providing an ink jet print head capable generating bubbles for ink drop ejection.

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3. Claims 3-4, 6-7, 9-10 & 12-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yoshimura (US 5,905,515) in view of Usui et al. (US 6,074,040)

**Yoshimura further disclose following claimed limitation:**

- \* wherein the material having the ultrahigh water-repellent property contains fluoroalkylmethoxysilane/fluorocarbon resin/ (col 2, lines 43-44, col 4, lines 50-57).

- \* forming a plurality of liquid channels so as to correspond to the plurality of driving elements (fig 1)

- \* forming a member for forming orifices at a distal end of a connected substrate (fig 1)

- \* coating a face surface, serving as an outer surface of the member, with a material having an ultrahigh water-repellent property and causing the orifices to communicate with corresponding ones of the liquid channels (fig 1).

- \* forming discharging ports in the coated member (fig 1)

- \* wherein the coating is performed according to a film forming method using a chemical vapor reaction or a radical polymerization reaction (col 4, lines 11-13)

**Yoshimura does not disclose the following claimed limitations:**

- \* wherein a contact angle made by the material having ultrahigh water-repellent property and the liquid is at least 150 degrees.

- \* a cleaning member for removing contamination adhering to the face surface serving as the outer surface of the member where said orifices are formed

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\* a polyurethane rubber elastic member/means of wiping using an elastic material such as rubber/, and wherein a water-repellent film is formed on a surface of said cleaning member contacting the face surface

\* forming a plurality of driving elements on a surface of at least one of a pair of substrates

\* connecting the pair of substrates so as to provide a laminated state in which a surface where the plurality of liquid channels are formed is a connecting surface

\* forming an element substrate made of silicon on a surface of at least one of a pair of substrates

\* forming a plurality of heating elements for generating thermal energy on the element substrate.

\* wherein the heat treatment is 150C performed after said coating step

**Usui et al. disclose the following:**

\* wherein a contact angle made by the material having ultrahigh water-repellent property and the liquid is more than about 100° (col 4, lines 46-50, col 14, lines 25-27) for the purpose of achieving no directions abnormalities of ink drops during the ejection

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\* a cleaning member for removing contamination adhering to the face surface serving as the outer surface of the member where said orifices are formed (col 7, line 62-col 8, line 6) for the purpose of repelling ink at the nozzle/orifice surface.

\* a polyurethane rubber elastic member/means of wiping using an elastic material such as rubber/, and wherein a water-repellent film is formed on a surface of said cleaning member contacting the face surface (col 7, line 62-col 8, line 6) for the purpose of eliminating unnecessary ink drops.

\*forming a plurality of driving elements on a surface of at least one of a pair of substrates (col 2, lines 29-37, col 5, lines 23-52, col 6, lines 10-27, col 22, lines 1-37, figs 1-4 & 14) for the purpose of providing an ink jet print head capable generating bubbles for ink drop ejection.

\* connecting the pair of substrates so as to provide a laminated state in which a surface where the plurality of liquid channels are formed is a connecting surface (col 12, lines 65-67) for the purpose achieving no abnormalities of ink drops during the ejection.

\* forming an element substrate made of silicon on a surface of at least one of a pair of substrates (col 12, lines 65-67) for the purpose achieving no abnormalities of ink drops during the ejection.

\* forming a plurality of heating elements for generating thermal energy on the element substrate(col 2, lines 29-37, col 5, lines 23-52, col 6, lines 10-27, col 22, lines



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1-37, figs 1-4 & 14) for the purpose of providing an ink jet print head capable generating bubbles for ink drop ejection.

\* wherein the heat treatment is more than about 100° performed after said coating step (col 4, lines 46-50, col 14, lines 25-27) for the purpose of achieving no direction abnormalities of ink drops during the ejection

**However, Usui et al. does not disclose**

\* a contact angle made by the material having ultrahigh water-repellent property and the liquid is at least 150 degrees.

\* wherein the heat treatment at 150 C is performed after said coating step

**Nevertheless**, it would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize a contact angle made by the material having ultrahigh water-repellent property and the liquid is at least 150 degrees, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art. In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980)

**Furthermore**, it would have been obvious at the time of the invention was made to a person having ordinary skill in the art to utilize a cleaning member for removing contamination adhering to the face surface serving as the outer surface of the member where said orifices are formed, a polyurethane rubber elastic member, and wherein a water-repellent film is formed on a surface of said cleaning member contacting the face surface, forming a plurality of driving elements on a surface of at least one of a pair of

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substrates, connecting the pair of substrates so as to provide a laminated state in which a surface where the plurality of liquid channels are formed is a connecting surface, forming an element substrate made of silicon on a surface of at least one of substrates, connecting the pair of substrates so as to provide a laminated state in which a surface where the plurality of liquid channels are formed is a connecting surface, forming an element substrate made of silicon on a surface of at least one of a pair of substrates, forming a plurality of heating elements for generating thermal energy on the element substrate, and a heat treatment that is 150C° performed after said coating step taught by Usui et al. into Yoshimura for the purposes of repelling ink at the nozzle/orifice surface, eliminating unnecessary ink drops, providing an ink jet print head capable generating bubbles for ink drop ejection, achieving no abnormalities of ink drops during the ejection, providing an ink jet print head capable generating bubbles for ink drop ejection, providing an ink jet print head capable generating bubbles for ink drop ejection and achieving no directions abnormalities of ink drops during the ejection.

### Communication with the USPTO

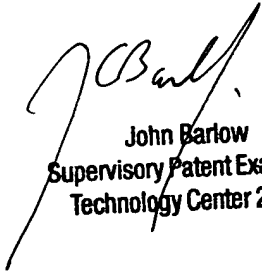
4. Any inquiry concerning this communication or earlier communications from the examiner should be directed to K. Feggins whose telephone number is 703-306-4548. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, J. Barlow can be reached on 703-308-3126. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-3432 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

KF

March 19, 2002

  
John Barlow  
Supervisory Patent Examiner  
Technology Center 2800